

Introduction

In the five decades of modern project management (the computer age), PM software developers have made constant strides in providing support within their tools for the continuing challenge of assigning resources to projects and tasks. Many of these solutions have failed to garner the support of the tools users. Some products have totally flopped and have quickly been removed from the market. Other products, while offering very valuable support for project managers, are not being used for automated resource scheduling. Project management software often fails to sync with real-life project management practices, leading users to reject the products that were supposed to help them.

50 Years of Poor Resource Scheduling

A brief history of automated resource scheduling will show why we have problems in this area. Soon after the birth of PERT and CPM computer-based scheduling, developers added capabilities for automated resource leveling and scheduling. Various algorithms were used to help planners optimize resource loads. The basic critical path schedules could be adjusted electronically to consider limitations in resources. In theory, this was nirvana – a purely utopian solution, or so it seemed. Yet in practice these capabilities were hardly ever used. There was a good reason for this: the automated solutions were far from realistic and usually very inefficient. Most computed resource-leveled plans showed significant voids – where resources were available to do needed work, but the system, looking for open blocks of availability, neglected to assign them. Improvements to the algorithm to allow interrupted assignments often made things worse by permitting inefficient breaks in the work.

In response to these failings, developers improved on the ability to define availability and assignment conditions (more work for the planners); yet solutions still tended to be less than optimal. In a classic illustration of overkill, resources were assigned, by specific name, to tasks two years in the future. But reality would indicate that the schedule would surely change (often within days), the resource pool would change, and even the work scope would change. *What the computer gave us was a very precise error, leading to a false confidence in the resource picture. This is still the default resource scheduling mode in today's tools, and this feature is still rarely used.*

The Requestor-Allocator Model (An Even Greater Failure)

About a decade ago, a new concept emerged that recognized the continuing need to define work (including non-project work) and allocate resources. I call this concept the Requestor-Allocator Model. Associated with this was the phenomenon of “the virtual organization.” This manifests in several ways. One is the organization that has a register of pre-qualified skills and experts who can be called upon to provide their expertise to support a project. They may be temporary hires, or work as independent contractors for that engagement. In many cases, they never even

show up at the company premises, but do their work from remote locations.

Another source of resources for the virtual organization is the “body shop.” In this mode, freelance resources are under contract to outsourcing firms which supply needed resources to external projects by request. Still another variation of outsourcing is where specific pieces of the project are sub-contracted outside of the firm. No matter how you look at it, these are all modes of “available resources” and they must be factored into the model of resource availability. This certainly complicates the exercise.

The Requestor-Allocator Model was supposed to work like this: someone with some work to do would post a request on the Requestor page, defining the project or non-project work items that required resources. Owners of resources, whether internal or external, could respond to accept the assignments. The flaw in this over-simplified solution was that there was absolutely no structure or control to the process. It assumed that the entire process could be ad-hoc. There was no leadership or management of the resources.

The allocation and assignment of resources is a continuing, reiterative process. The functional managers (the resource owners) and the project managers (the resource users) must do more than just communicate needs and availability. They must continually communicate their plans, intentions and forecasts. The allocation and assignment of resources is part of a larger, structured process involving the formation of ideas and issues, the creation of projects to pursue the idea or address the issue, the ranking and selection of projects based on strategic alignment, benefits, risks, and impact on resources, and the balancing of initiatives, demand, and capacity.

In my opinion, it was the lack of this enterprise-wide, full life-cycle vision, as well as the lack of in-depth communication, that led to the failure of the Requestor-Allocator concept, which died a quick death in the late 1990's. Two companies—Microsoft (Team Play) and Artemis (ResourceView)—abandoned their products; ABT elected not to bring theirs to market.

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Resource planning cannot be unidirectional, either by the tasks or the resources, and neither can operate in a vacuum. The size and capabilities of the resource pool will impact project selection and capacity decisions. And the project-driven strategies will dictate the needs for resources.

Defining Allocation and Assignment

Before getting into a discussion of some best practices for managing resources in the project environment, I want to make certain that we are all on the same page relative to two important terms.

Resource Allocation refers to the general allocation of resources to a project, or portions of a project, for a defined time period. The allocations may be specified by role or skill, or by specific individual. In practice, as a project is first defined resources will be allocated by role, or a team of individuals will be designated as “allocated” to the project. We sometimes refer to these allocations as “soft booking,” as the specific scope and timing of the work is still being refined at this point, and the resources are provisionally set aside pending approval of the work.

Resource Assignment refers to the definitive assignment of individuals to defined tasks. Assignments are a progressive process as the work gets defined down to the task level and the schedule is being developed. Actual timekeeping, if performed, will be against these assignments.

Although Allocations and Assignments are different, just how they differ depends on the type of organization and the nature of the work. For instance, in a traditional matrix-type operation resources may be allocated to projects by the resource owners, but assigned to specific work by the project managers. In other instances, the resource owner may also manage the projects. In these instances, the allocations serve primarily as a budgeting process, helping the resource owner to analyze project support capacities.

A Practical, Bi-directional Resource-driven Methodology for Portfolio Management

All project and resource decisions are driven by the corporate mission and strategy. A high-level strategic plan will spell out the intentions of the organization, triggering actions on both the project and resource sides of the house. Typically, a rough model of budget and head-count parameters will be developed to support the strategic plan.

The plan may also provide guidelines for project allocation. This would define the desired balance of resources between types of projects, such as:

- Maintenance, Utility, or Regulatory Projects (support ongoing operations)
- Growth or Enhancement Projects (grow the business)
- Exploratory or Transformation Projects (new opportunities)

Also, non-project work, such as:

- Foundation work (on-going, non-project)
- Applications Support (for IT operations)

Following these high-level guidelines, several actions should occur in parallel. The resource managers will evaluate and publish their current and potential staffing. This would include current and promised allocations, unallocated resources, and readily attainable (external) resources. Resource head-count should be justified against any applicable budgetary constraints.

For organizations with mostly internal projects, project sponsors will propose projects in support of the strategic initiatives. For organizations that primarily do external projects for income, the sales function might act as the project sponsor. All project proposals must include definition of resource needs.

In the early stages of this iterative process, proposed projects will be evaluated for (1) alignment with strategies, (2) perceived value and benefits, and (3) potential for technical and commercial success, all leading to a preliminary prioritization of proposed projects.

Now, working with the preliminary project selection group, resource managers run trial allocations of skills to projects. These allocations need not be by individual name and certainly would not be to individual tasks. It is more of a “let’s allocate a civil engineer, half-time, to the conceptual design phase of project Alpha.”

Eventually, the trial and error allocations will produce a master plan that will:

- Optimize the use of resources in support of a portfolio of projects
- Provide the greatest realization of benefits in support of the published strategies

Once the selection of projects is agreed to, the resource managers will fine tune and publish the allocations. These are still primarily at the skill level (but could be specifically-named resources), and are aligned with phases of the projects. For projects that have not yet started, this is called “soft-booking.” The allocations show up on the resource schedules as committed, but not assigned, resources. The fine-tuning activity will also experiment with the timing of the selected projects to optimize the use of resources.

All of this is repeated on a periodic basis, adjusting allocations based on changes in timing and/or scope of existing projects, delays or the cancellation of approved projects, and the addition of newly proposed projects to the pipeline.

The resource plan will include proposed sources (internal or external) and may also incorporate resource costs. These will

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be reconciled with the budgeted head count and finances. The resource plan will identify the current individuals within each skill category, and will display current and committed allocations.

In this model, resources are not necessarily assigned to individual tasks by the resource manager. They are allocated to the project for a segment of the work scope (or the entire project). The specific assignment to tasks, as well as decisions on when the tasks shall be performed, are the purview of the project managers.

Expanding the Resource Allocation Capabilities in PM Tools

In the enterprise, our resource pool may be quite large. It may consist of permanent, temporary and outsourced personnel, having multiple skills, in multiple locations. The resources may be allocated to single projects, or split among multiple projects. They may be allocated for specified time segments, or possibly reserved for pending projects.

PM solutions must allow for these conditions. They must allow a project manager to define required skills and schedules for key phases, and the system must allow initial assignment by classification (and role/skill) as an option, with an eye to eventually selecting a specific resource. The system must aid in this selection, working from an enterprise-wide database. Conditional allocations must be able to be made to reserve resources for opportunities that are not yet approved projects. Classic resource leveling routines are not adequate to do the job. In fact, they are contra-indicated in most scenarios.

Interactive, spreadsheet-style displays, supporting discrete allocations, are essential to supporting this iterative process and for displaying results of decisions in real-time. The ability to have unlimited undo/redo functionality is a key factor in practical support for this function. This is the keystone to running test allocations and evaluating alternative solutions. Furthermore, you will want to establish (multiple) baselines so one or more plans can be retained for further experimentation with the allocations.

A Project Portfolio Management Solution that Supports this Model

As I was preparing this paper for publication, I became involved in a situation that caused me to take a look at **@task**, a leading member of the project planning community and a solution optimized from the outset to support resource management within a PPM environment. What I found was a very strong alignment between the features and capabilities in **@task** and the characteristics I just described above.

Support for these functions is accomplished via two functions within the product, called: **Capacity Planner** and **Team Builder**.

Capacity Planner uses a combination of panels to facilitate the allocation of resources to projects. The three primary screens (all in spreadsheet-type format) are:

- Resource Pool – What resources are on board
- Projects – Shows what resources are allocated to projects
- Remaining Resources – The un-allocated resource levels

In the typical workflow, issues, ideas, and opportunities are developed into project proposals, containing data relative to benefits, risks, strategic alignment, and budget impact (including resource demands). Working with the three spreadsheet-type screens, resources are allocated to the proposed projects, generally by role/skill. Trial allocations and reversals allow for looking at different project mixes and schedule adjustments. Preferred allocation plans can then be communicated to project and resource managers for concurrence or adjustment and then published to the community. Working with the three screens allows resources to be allocated until availabilities are exhausted or exceeded.

Team Builder features a four-part screen. The upper half displays selected resource groups and availability in spreadsheet style. The lower half displays project tasks on the left, with a choice of three windows on the right. These are: Gantt view, Work Required (hours per week by role for each task), and Work Remaining (items not yet assigned).

Starting with the preferred resource group, resources are assigned to tasks based on the listed roles and estimated hours. By selecting multiple tasks at one time, the solution looks for resources that have availability for the entire set of tasks, assuring continuity. As resources are selected, actual names replace the role name in the assignments list. If there are insufficient resources to populate the entire project, the shortages are highlighted in the Work Remaining window. You can then look at other resource groups for available resources.

Team Builder aligns resources with tasks and reaches across organizations to supplement shortages and to find work for unassigned resources. This is all very interactive and real-time.

The New World of Resource Allocation

So, what have we learned in the past 50 years about managing resources on projects and associated work?

Certainly, we learned that we can't leave the entire process up to the computer. Yet, for sure, we can't do an adequate job without the aid of the computer. We learned that addressing demand and capacity issues requires a structured, repeatable approach, working with published guidelines and integrated tools. We learned that resource planning does not start with assigning people to individual tasks, but more likely with the allocation of generic resources (by role/skill) to portfolios and projects, for later assignment to the actual work. We learned

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that this process cannot just be passed back and forth between requestors and providers, but rather that it works best when both work together using a common framework. We learned that people often work better in teams and that the allocation process should support the building of effective teams for continuity and efficiency. And, lastly, we learned that this is an iterative process, often involving trial and error, leading to refinement and subject to frequent updating. Insisting on a robust tool that clearly presents the capacity, current assignments, and options for additional allocations and assignments is essential.

Project managers and resource managers, working together, within a published strategy-driven environment, supported by dynamic and practical tools. This is the new world of resource allocation.

About the Author

Harvey A. Levine has been a project management specialist and consultant since 1962. In addition to contributing to PM journals and web sites, Levine provides applications, system design, and consulting services in project planning and control. He served as president and chairman of the board of directors of the Project Management Institute and is a PMI fellow.

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